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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/731,352

12/09/2003

Robert J. Sanger

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01/08/2008

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EXAMINER

AKRAM, IMRAN

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

01/08/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/731,352

Applicant(s)

SANGER, ROBERT J.

Examiner

Imran Akram

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 8-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17:2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/9/03.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-7, drawn to a compact hydrogen generator, classified in class 48, subclass 127.9.
 - II. Claims 8-20, drawn to a process for generating hydrogen, classified in class 48, subclass 127.1.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus of group I can be reformed and the carbon monoxide can be converted via shift reactor before heat exchange occurs.

Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;

(c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);

(d) the prior art applicable to one invention would not likely be applicable to another invention;

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is

the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

3. During a telephone conversation with Maryann Maas on 12/7/07 a provisional election was made without traverse to prosecute the invention of group I, claim 1-7. Affirmation of this election must be made by applicant in replying to this Office action. Claims 8-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

4. Claims 6 and 7 recite the limitation "the water gas shift reactor" in claim 1. Examiner assumes this term refers to the shift reactor of claim 1 as they are interchangeable terms. However, consistency for clarity is recommended.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 2 and 3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant further limits parent claim 1 with an indirect heat exchanger positioned upstream of the heat exchanger/distributor, but the heat exchanger/distributor as defined by claim 1 comprises an indirect heat exchanger. For

the purposes of examination, from the specification examiner assumes that claims 2 and 3 recite a second indirect heat exchanger for the purposes of examination.

Correction of the claim language to differentiate the two separate and distinct indirect heat exchangers is required, however.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-3 are rejected under 35 U.S.C. 102(e) as being anticipated by Bentley (US 7,066,973 B1).

9. Regarding claim 1, Bentley discloses a reformer **12** for comprising a steam reformer **35** for producing reformat from fuel, a downstream catalytic shift reactor **37**, a conduit (see figure 6) for passing reformat from the reformer to the shift reactors, and a heat exchanger/distributor within the conduit, said heat exchanger/distributor comprising: an indirect heat exchanger **39** adapted to receive liquid water and having sufficient area to vaporize the received water to steam and adapted to cool the reformat in the conduit (column 14, lines 35-41), at least one separator (SS) in fluid

communication with the indirect heat exchanger adapted to receive steam from the indirect heat exchanger, remove substantially all liquid water, and distribute the steam into the reformer to create reformat (column 20, lines 3-5).

10. Regarding claims 2 and 3, Bentley discloses an indirect heat exchanger positioned upstream of the heat exchanger/distributor (see figure 23).

11. Claims 1, 4, 6, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Gondouin (US 5,052,482).

12. Regarding claim 1, Gondouin discloses a hydrogen generator (see equation 6) comprising a reformer for converting a fuel and steam and oxygen into a reformat containing hydrogen and carbon oxides (equation 3'), a downstream shift reactor for converting carbon monoxide in the reformat with water to carbon dioxide and hydrogen (equation 7), said shift reactor having at least on catalyst stage **47**, a conduit **4** from the reformer and encompassing the shift reactor for passing the reformat from the reformer through the shift reactor **47**, and a heat exchanger/distributor within the conduit for cooling the reformat, said heat exchanger/distributor comprising: an indirect heat exchanger adapted to receive liquid water and having sufficient area to vaporize the received water to steam and adapted to cool the reformat in the conduit (column 13, lines 41-48); at least one separator in fluid communication with the indirect heat exchanger adapted to receive steam from the indirect heat exchanger and remove substantially all liquid water (column 2, lines 37-58); and at least one steam distributor **18** in fluid communication with the separator **19** to pass the steam into the reformat.

13. Regarding claim 4, Gondouin discloses the separator to be a riser (column 5, lines 50-58).
14. Regarding claim 6, Gondouin discloses the separator **19** to be located between the shift reforming section (unlabeled, above **47** in figure 10) and the water gas shift reactor (unlabeled, catalyst below **47** in figure 10).
15. Regarding claim 7, Gondouin discloses the separator **19** to be located between shift reactor **47** and the water gas shift reactor (unlabeled, catalyst below **47** in figure 10).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley as applied to claim 1 above, and further in view of Grasso (US 4,344,850).

19. While Bentley discloses a separator (SS), Bentley does not disclose what type of separator it is or how it performs its function. Grasso, however, also discloses a hydrogen generator with steam/water separation means and indirect heat exchange. Grasso discloses a reformer **32** for producing hydrogen that includes a water coolant system with a steam separator **26** that is a riser (column 4, lines 56-61). The benefits of Grasso's riser include minimizing the water usage and providing a purer water/steam source (column 2, lines 9-20). It would have been obvious to one having ordinary skill in the art at the time of the invention to provide the separator functioning as a riser of Grasso in lieu of the separator of Bentley as the substitution would have yielded predictable and beneficial results. Grasso's coolant system provides a cleaner and consequently more efficient fuel cell system by decreasing impurity accumulation—an obvious advantage.

20. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bentley.

21. Bentley discloses the steam separator and distributor to be integral—that is, the steam is distributed by the steam separator (see figure 28) via two streams. Bentley, however, does not disclose the use of four distributions. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide more distribution streams from the steam separator if more sections of the invention required steam. Steam is an important component in the invention of Bentley and providing it to all of the components that required steam through the steam separator would be advantageous. See also MPEP § 2144.04 VI(b).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Imran Akram whose telephone number is 571-270-3241. The examiner can normally be reached on 10-7 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

IA


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